

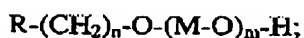
U.S. Serial No. 10/675,169
Reply to Office Action of: September 6, 2005
Family Number: P2002J108

IV. CLAIM AMENDMENTS

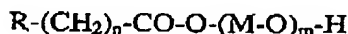
Please amend claim 4. Claims 1-15 are currently pending.

1. (Original): In a fuel cell system comprising a reformer to produce hydrogen containing gas for use in a fuel cell stack, the improvement comprising: feeding to the reformer, at start-up, an emulsion composition comprising,

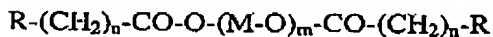
- at least 40wt% of hydrocarbon,
- from 30 to 60wt% of water, and
- from 0.01 to 5 wt% of a surfactant mixture comprising at least one surfactant from each of two types of surfactants, one type of surfactant comprising surfactants selected from the group consisting of alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters and the other type of surfactant comprising surfactants selected from the group consisting of alkyl polyglycerol monoesters and alkyl polyglycerol diesters, said alkoxyated alkyl alcohols represented by the formula,



said alkoxyated alkyl monoesters represented by the formula,



said alkoxyated alkyl diesters represented by the formula,



where R is a methyl group, n is an integer from about 5 to 17, m is an integer from about 2 to 50, M is CH₂-CH₂, CH₂-CH₂-CH₂, CH₂-CH-CH₃,

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$\text{CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2$, $\text{CH}_2\text{-CH-(CH}_3\text{)-CH}_2$ or mixtures thereof,

said alkyl polyglycerol monoesters represented by the general formula,

$\text{R}'\text{-CO-O-CH}_2\text{-CHOH-CHOH-(CHOH-CHOH-CHOH)}_p\text{-CHOH-CHOH-CH}_2\text{OH}$

and, said alkyl polyglycerol diesters represented by the general formula,

$\text{R}'\text{-CO-O-CH}_2\text{-CHOH-CHOH-(CHOH-CHOH-CHOH)}_p\text{-CHOH-CHOH-CH}_2\text{-O-CO-R}'$

where R' is an alkyl group of 2 to 26 carbon atoms and p is an integer from about 0 to 15.

2. (Original): The improvement of claim 1 wherein the emulsion further comprises up to 20 wt% alcohol based on the total weight of the said emulsion wherein said alcohol is selected from the group consisting of methanol, ethanol, n-propanol, iso-propanol, n-butanol, sec-butyl alcohol, tertiary butyl alcohol, n-pentanol, ethylene glycol, propylene glycol, butyleneglycol and mixtures thereof.

3. (Original): The improvement of claim 1 wherein said hydrocarbon is in the boiling range of -1°C to 260°C

4. (Currently amended): The improvement of claim 1 wherein said water is substantially free of salts of halides, sulfates and carbonates of ~~Group I and Group II elements of the long form of The Periodic Table of Elements~~ H, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, and Ra.

5. (Original): The improvement of claim 1 wherein the emulsion is a complex oil-in-water-in-oil emulsion.

6. (Original): The improvement of claim 1 wherein said alkoxyated alkyl alcohols, alkoxyated alkyl monoesters, alkoxyated alkyl diesters, alkyl polyglycerol monoesters and alkyl polyglycerol diesters thermally decompose at temperatures in the range of about 250°C to about 700°C .

7. (Original): The improvement of claim 1 wherein in said alkoxyated alkyl alcohols, alkoxyated alkyl monoesters, alkoxyated alkyl diesters the alkoxyated group is an ethoxyated group.

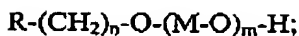
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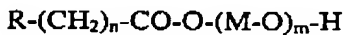
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8. (Original): A method to prepare a complex oil-in-water-in-oil emulsion comprising mixing at mixing energy in the range of 0.15×10^{-5} to 0.15×10^{-3} kW/liter of fluid,

- at least 40wt% of hydrocarbon,
- from 30 to 60wt% of water, and
- from 0.01 to 5 wt% of a surfactant mixture comprising at least one surfactant from each of two types of surfactants, one type of surfactant comprising surfactants selected from the group consisting of alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters and the other type of surfactant comprising surfactants selected from the group consisting of alkyl polyglycerol monoesters and alkyl polyglycerol diesters, said alkoxyated alkyl alcohols represented by the formula,



said alkoxyated alkyl monoesters represented by the formula,



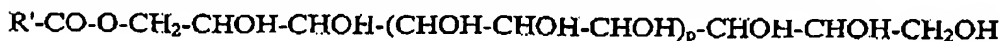
said alkoxyated alkyl diesters represented by the formula,



where R is a methyl group, n is an integer from about 5 to 17, m is an integer from about 2 to 50, M is CH_2-CH_2 , $CH_2-CH_2-CH_2$, $CH_2-CH-CH_3$,

$CH_2-CH_2-CH_2-CH_2$, $CH_2-CH-(CH_3)-CH_2$ or mixtures thereof,

said alkyl polyglycerol monoesters represented by the general formula,



and, said alkyl polyglycerol diesters represented by the general formula,

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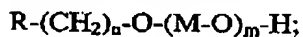
where R' is an alkyl group of 2 to 26 carbon atoms and p is an integer from about 0 to 15.

9. (Original): The method of claim 8 wherein mixing is conducted by an in-line mixer, static paddle mixer, sonicator or combinations thereof.

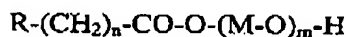
10. (Original): The method of claim 8 wherein said mixing is conducted for a time period in the range of 1 second to about 15 minutes.

11. (Original): A complex oil-in-water-in-oil emulsion comprising:

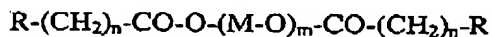
- at least 40wt% of hydrocarbon,
- from 30 to 60wt% of water, and
- from 0.01 to 5 wt% of a surfactant mixture comprising at least one surfactant from each of two types of surfactants, one type of surfactant comprising surfactants selected from the group consisting of alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters and the other type of surfactant comprising surfactants selected from the group consisting of alkyl polyglycerol monoesters and alkyl polyglycerol diesters, said alkoxyated alkyl alcohols represented by the formula,



said alkoxyated alkyl monoesters represented by the formula,



said alkoxyated alkyl diesters represented by the formula,



where R is a methyl group, n is an integer from about 5 to 17, m is an integer from about 2 to 50, M is CH_2-CH_2 , $CH_2-CH_2-CH_2$, $CH_2-CH-CH_3$,

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$\text{CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2$, $\text{CH}_2\text{-CH-(CH}_3\text{)-CH}_2$ or mixtures thereof,

said alkyl polyglycerol monoesters represented by the general formula,

$\text{R}'\text{-CO-O-CH}_2\text{-CHOH-CHOH-(CHOH-CHOH-CHOH)}_p\text{-CHOH-CHOH-CH}_2\text{OH}$

and, said alkyl polyglycerol diesters represented by the general formula,

$\text{R}'\text{-CO-O-CH}_2\text{-CHOH-CHOH-(CHOH-CHOH-CHOH)}_p\text{-CHOH-CHOH-CH}_2\text{-O-CO-R}'$

where R' is an alkyl group of 2 to 26 carbon atoms and p is an integer from about 0 to 15.

12. (Original): The complex oil-in-water-in-oil emulsion of claim 11 further comprising up to 20 wt% alcohol based on the total weight of the said emulsion wherein said alcohol is selected from the group consisting of methanol, ethanol, n-propanol, iso-propanol, n-butanol, sec-butyl alcohol, tertiary butyl alcohol, n-pentanol, ethylene glycol, propylene glycol, butyleneglycol and mixtures thereof.

13. (Original): The composition of claim 11 wherein in said alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters the alkoxyated group is an ethoxyated group.

14. (Original): The complex oil-in-water-in-oil emulsion of claim 11 wherein said emulsion has conductivity in the range of 3 to 15 mhos at 25°C.

15. (Original): The complex oil-in-water-in-oil emulsion of claim 11 wherein said emulsion is stable to freeze thaw cycles in the temperature range of -54°C to +50°C.